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Mathematica

THE DEFINITIVE SYSTEM FOR TECHNICAL COMPUTATION

"Not merely a product but a revolution"

— Macworld

"The importance of the program cannot be overlooked"

— New York Times

Basic function: Integrated environment for numerical, symbolic, graphical computation, interactive programming.

Users: Scientists, engineers, mathematicians, programmers, financial analysts, students. Includes all 50 largest U.S. universities.

Numerical computation: Arbitrary-precision arithmetic, complex numbers, special functions (hypergeometric, elliptic, etc.), combinatorial and integer functions. Matrix operations, root finding, function fitting, Fourier transforms, numerical integration, numerical solution of differential equations, function minimization, linear programming.

```

Numerical Computation
In[1]:=
3^70
Out[1]:=
2503155504993241601315571986085849
In[2]:=
Hypergeometric2F1[7, 5, 4.1, 3-I]
Out[2]:=
-0.00403761 - 0.00295663 I
  
```

Symbolic computation: Equation solving, symbolic integration, differentiation, power series, limits. Algebraic operations, polynomial expansion, factorization, simplification. Operations on matrices, tensors, lists, strings.

```

Symbolic Computation
In[1]:=
Integrate[x / (a + Exp[x]), x]
Out[1]:=
x^2 / (2 a) - x Log[1 + E^x/a] / a - PolyLog[2, -(E^x/a)] / a
  
```

Graphics and sound: 2D, 3D plots of functions, data, geometrical objects. Contour, density plots. 3D rendering with intersecting surfaces, lighting models, symbolic descriptions. Color PostScript output, combining and labeling, publication-quality graphics, animation (most versions). Sound from waveforms and data (most versions).

Programming: High-level, interactive, symbolic language. Procedural and functional programming constructs. Transformation rules and pattern



Graphic generated and rendered with Mathematica.

matching. Fully compatible on all platforms. No built-in limitations on computation size.

```

Programming
log[1] = 0
log[E] = 1
log[x_ y_] := log[x] + log[y]
log[x_^n_] := n log[x]
log'[x_] = 1/x (* derivative *)
log/: InverseFunction[log] = exp
log/: Series[log[x_], {x_, 1, n_}] :=
Sum[(-1)^k (x-1)^k/k, {k, 1, n}] +
O[x, 1]^(n+1)
  
```

External interface: Input of data (numbers, records, text) from files, programs. Output in TeX, C, Fortran, PostScript. Calling of external programs and functions. General *MathLink*® interprocess communication mechanism.

User interface: Electronic book interactive documents mixing text, graphics, animations, calculations. Graphics, animation, sound interapplication compatibility. Style sheets, hierarchical outlining. Computation kernel can run on remote computer (most versions).

Additional material: Journals, newsletters, more than 100 books. Add-on packages, free *MathSource*® electronic resource.

Versions: Macintosh, Power Macintosh • Microsoft Windows, Windows NT • MS-DOS • IBM OS/2 • Sun SPARC • DEC RISC Ultrix, Digital UNIX, VAX/VMS, Alpha System OpenVMS • HP • Hitachi • IBM RISC • MIPS • NEC PC • NEC EWS • NEXTSTEP • Linux • SGI • CONVEX • and others. Network licensing available. Student versions. Now shipping Version 2.2.

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